

# LIVING BREAKWATERS CAC MEETING

05/xx/2021



Governor's Office of  
Storm Recovery

DESIGN

SCAPE

COWI

ARCADIS

wsp

seac  
Ecological Marine Consulting

MES

CONSTRUCTION  
MANAGEMENT

RAMBOLL

Baird.  
Innovation Engineered.

CONSTRUCTION

W

W

WEEKS

**WELCOME!**

# LIVING BREAKWATERS

An aerial photograph of a coastal city, likely San Francisco, showing a dense urban grid of buildings and streets. The city is bordered by a body of water. A breakwater project is visible, consisting of several long, rectangular structures extending from the shoreline into the water. The water is dark blue, and the shoreline is a mix of green vegetation and sandy areas. The breakwater structures are light-colored, possibly concrete or stone, and are arranged in a line that follows the curve of the coast. The overall scene is a mix of urban development and natural coastal features.

Spring 2021

# AGENDA

LIVING BREAKWATERS

CAC MTG

05/XX/21

**Project Overview**

**Status Update**

**Design Changes**

**Budget**

**Construction Schedule**

**Q&A**

# Project Overview (recap)

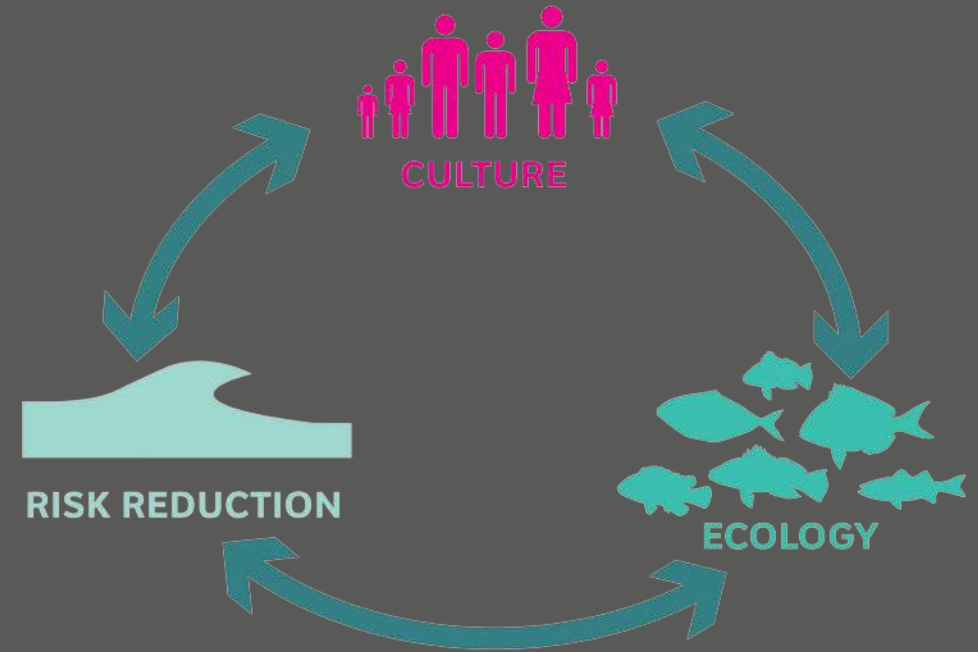


# GOALS:

**Reduce Coastal Risk**  
(erosion + storm waves)

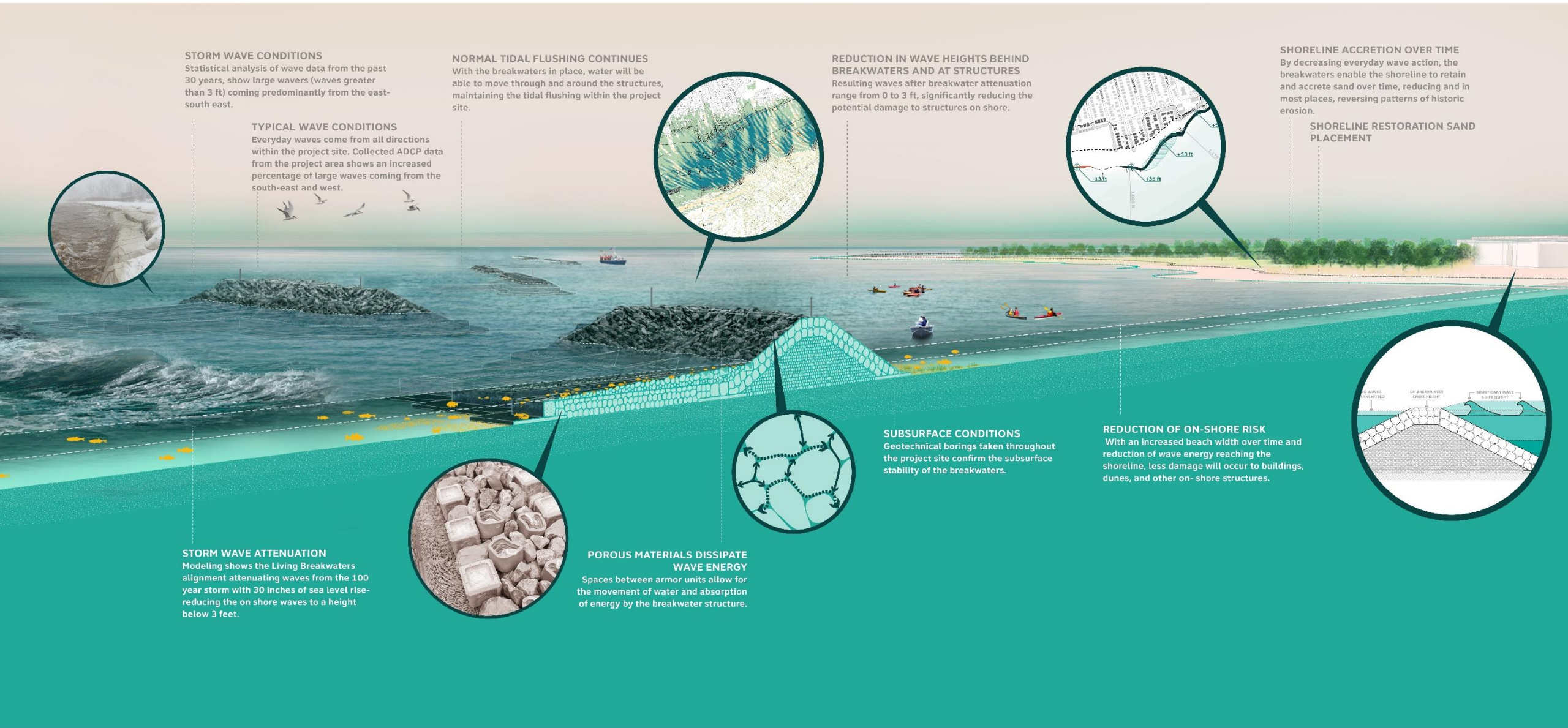
**Enhance Ecosystems**  
(near-shore & shoreline habitats)

**Foster Social Resilience**  
(education, stewardship, public water access)



# LIVING BREAKWATERS

Engineered to *reduce risk* and *create habitat*





# LIVING BREAKWATERS





Engineered to *reduce risk* and create *habitat*

LIVING BREAKWATERS  
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05/XX/21

VULNERABLE STRUCTURES AND INFRASTRUCTURE  
EXPOSED TO STORM WAVE ACTION IN THE  
1% ANNUAL CHANCE STORM

FEMA V ZONE  
WAVES > 3.0'

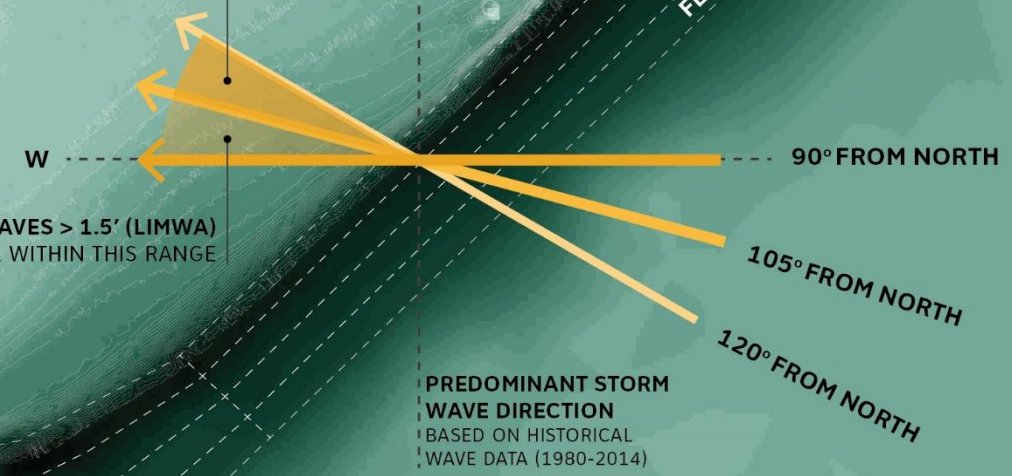
LIMIT OF MODERATE WAVE ACTION (LIMWA)  
WAVES > 1.5'

- 1978 MHW LINE
- 2015 MHW LINE
- CURRENT MLW LINE
-  HISTORIC SHORELINE EROSION
-  HISTORIC SHORELINE ACCRETION
- VE ZONE LINE
- LIMWA LINE
-  SHORELINE STRUCTURES
-  STRUCTURES WITHIN RISK ZONES

DATA SOURCES:  
PREDOMINANT WAVE DIRECTION DEVELOPED BY ARCADIS  
USING WAVE TRANSFORMATION MODELING FROM NEARBY  
WIS STATION  
2015 MHW LINE AND SHORELINE STRUCTURES SURVEYED  
BY NYACK, SUPPLEMENTED WITH 2014 LIDAR AND  
HISTORIC AERIAL IMAGERY  
CHANNEL EDGE: BASED ON COORDINATES PROVIDED  
BY USACE (JOHN BELDIN-QUINONES ) ON 2/25/2015  
CONTOUR BATHYMETRY GENERATED BY HILL

100% OF WAVES > 3' (V ZONE)  
48.5% OF WAVES > 1.5' (LIMWA)  
FALL WITHIN THIS RANGE

17% OF WAVES > 1.5' (LIMWA)  
FALL WITHIN THIS RANGE



PREDOMINANT STORM  
WAVE DIRECTION  
BASED ON HISTORICAL  
WAVE DATA (1980-2014)

FEDERAL NAVIGATION CHANNEL



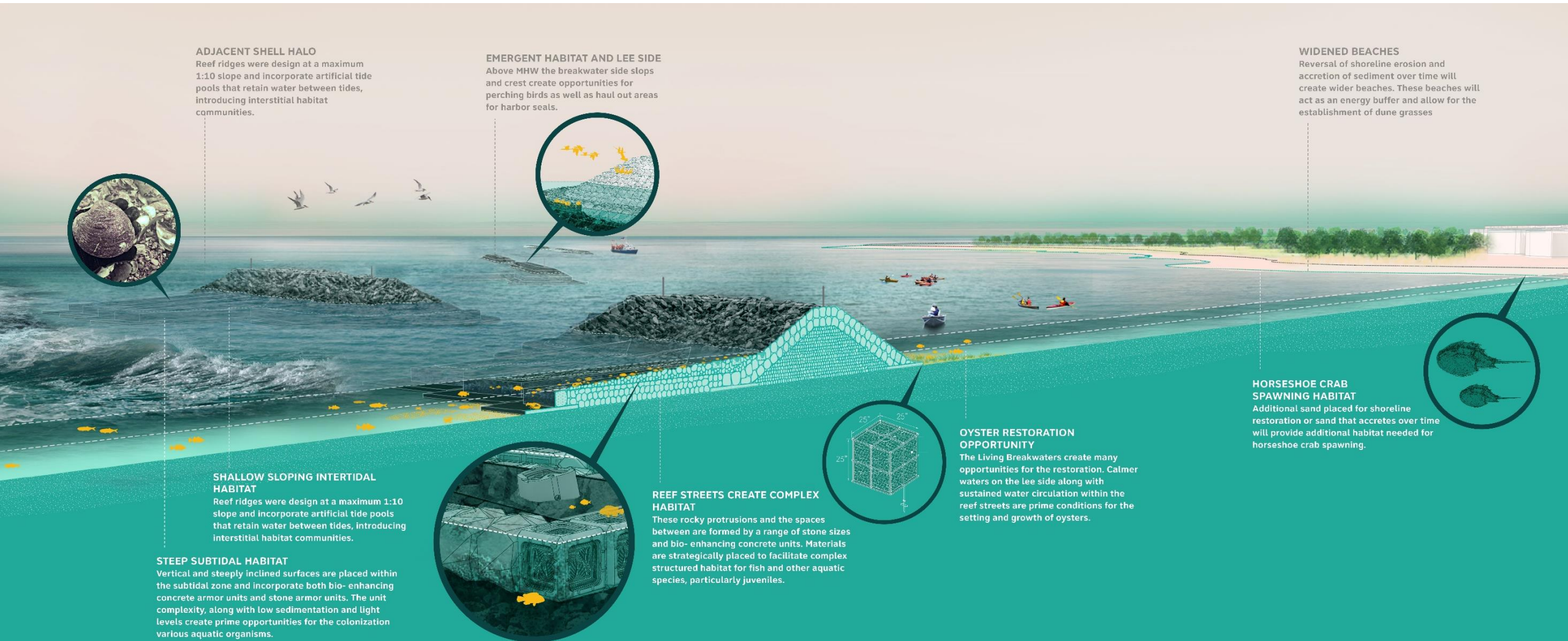
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*Engineered to reduce risk and **create habitat***

LIVING BREAKWATERS

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05/XX/21

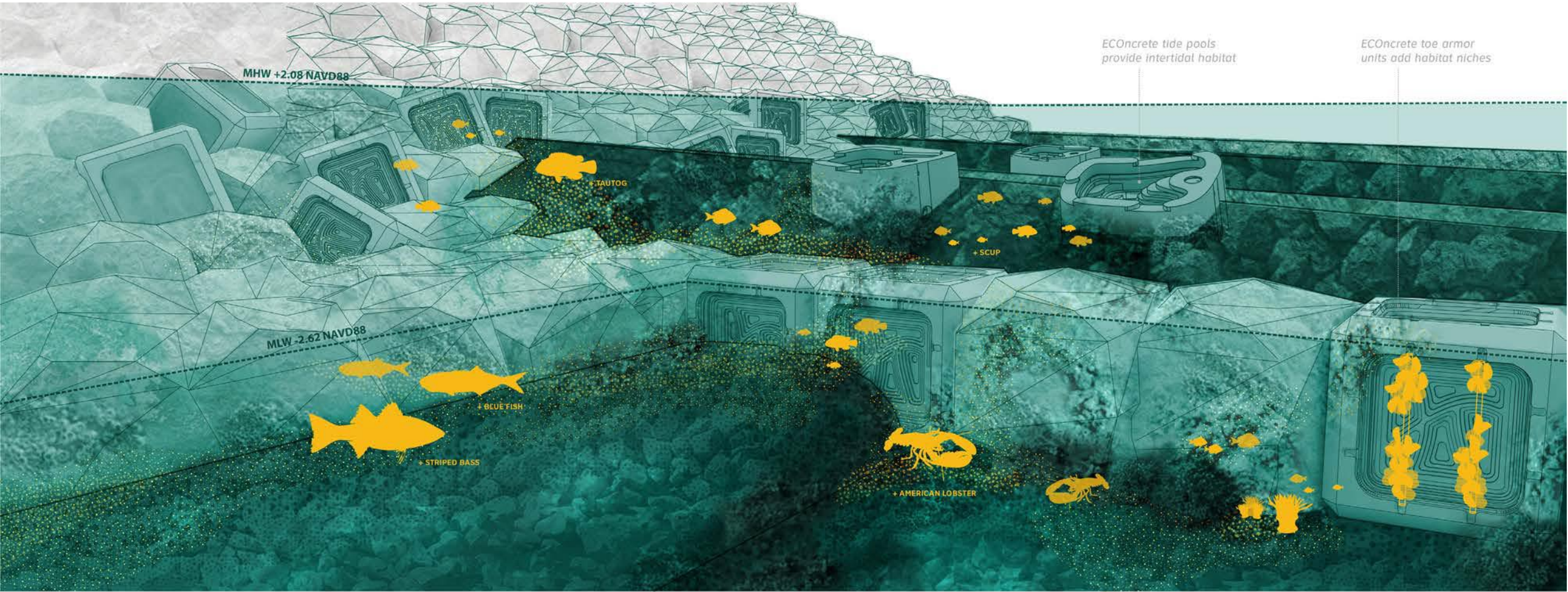




# LIVING BREAKWATERS

Engineered to reduce risk and *create habitat*

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# LIVING BREAKWATERS + OYSTERS

*The Billion Oyster Project*

LIVING BREAKWATERS

CAC MTG

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# LIVING BREAKWATERS COMMUNITY

*Involvement, Education & Engagement*

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# LIVING BREAKWATERS COMMUNITY

*Community Advisory Committee – THANK YOU!*

LIVING BREAKWATERS

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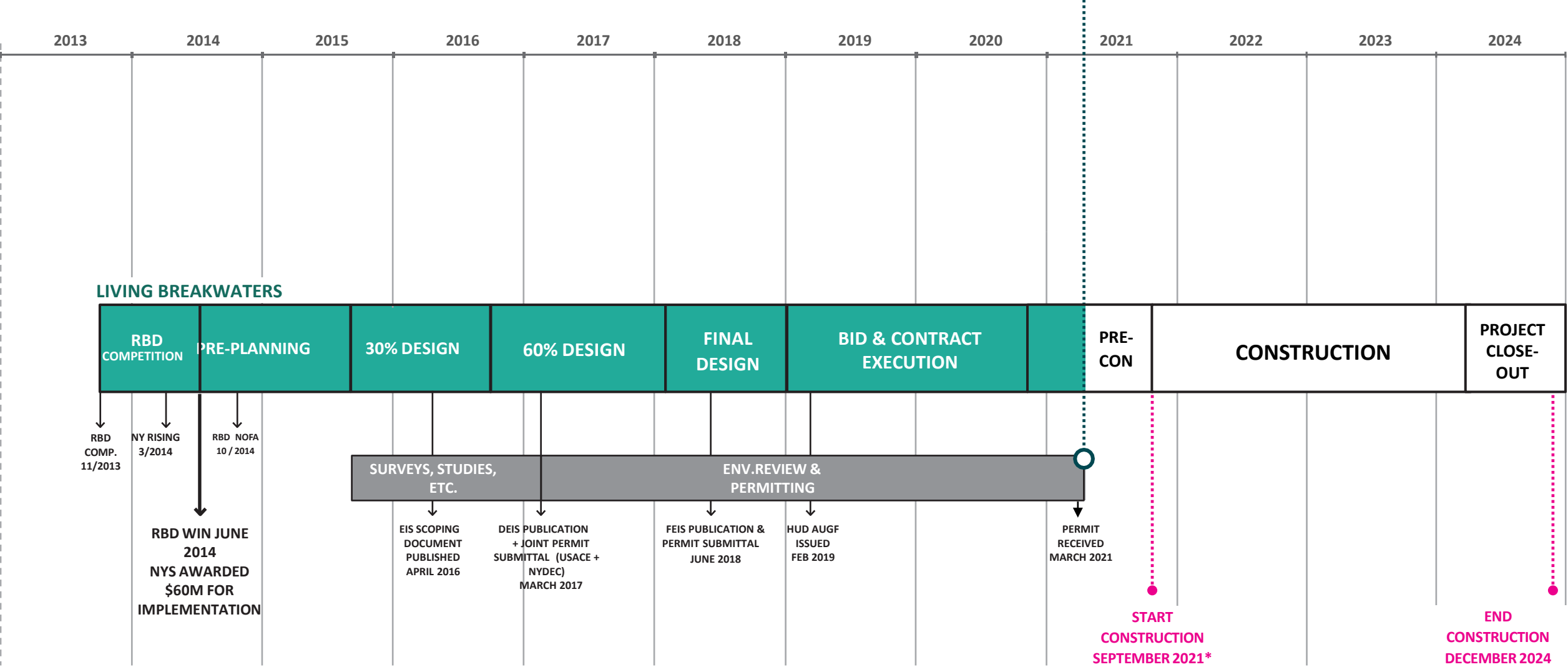
# Status Update: Construction Schedule



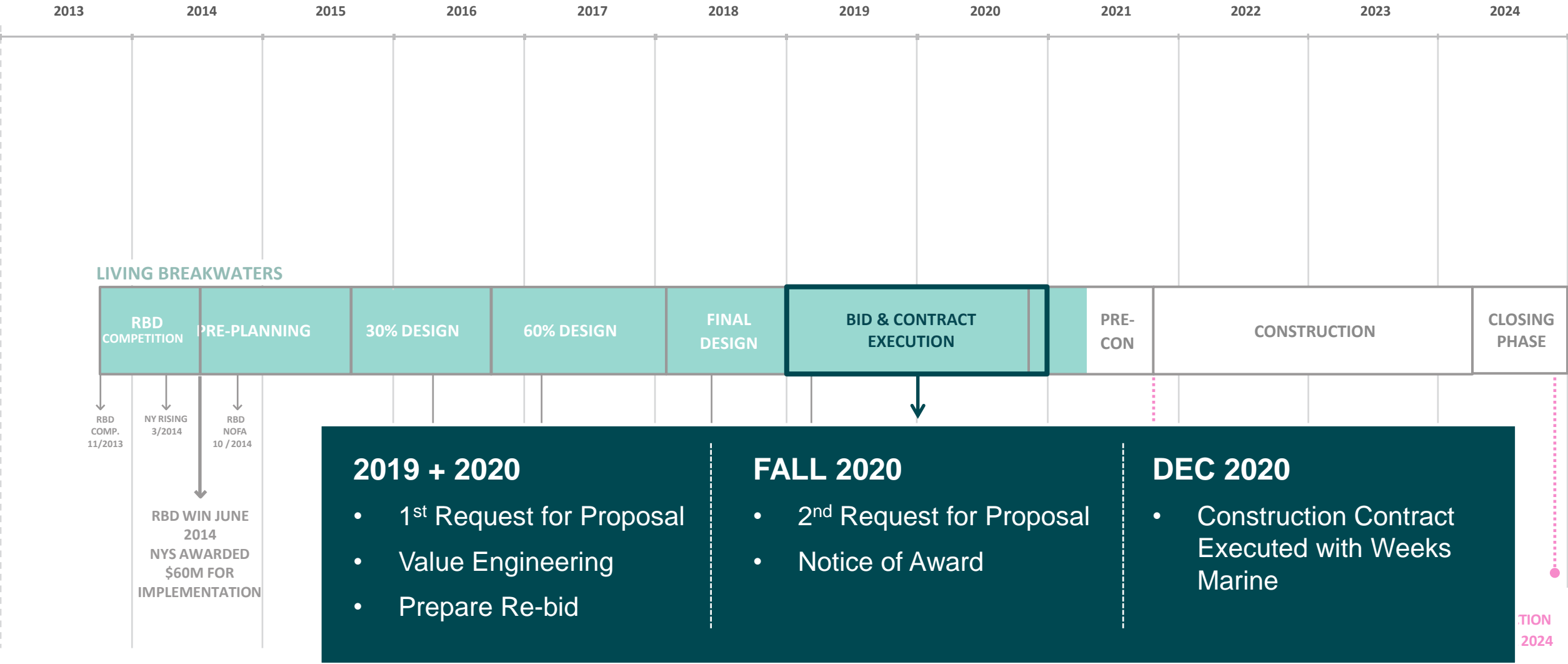
# PROJECT TIMELINE

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WE ARE HERE !



# PROCUREMENT TIMELINE

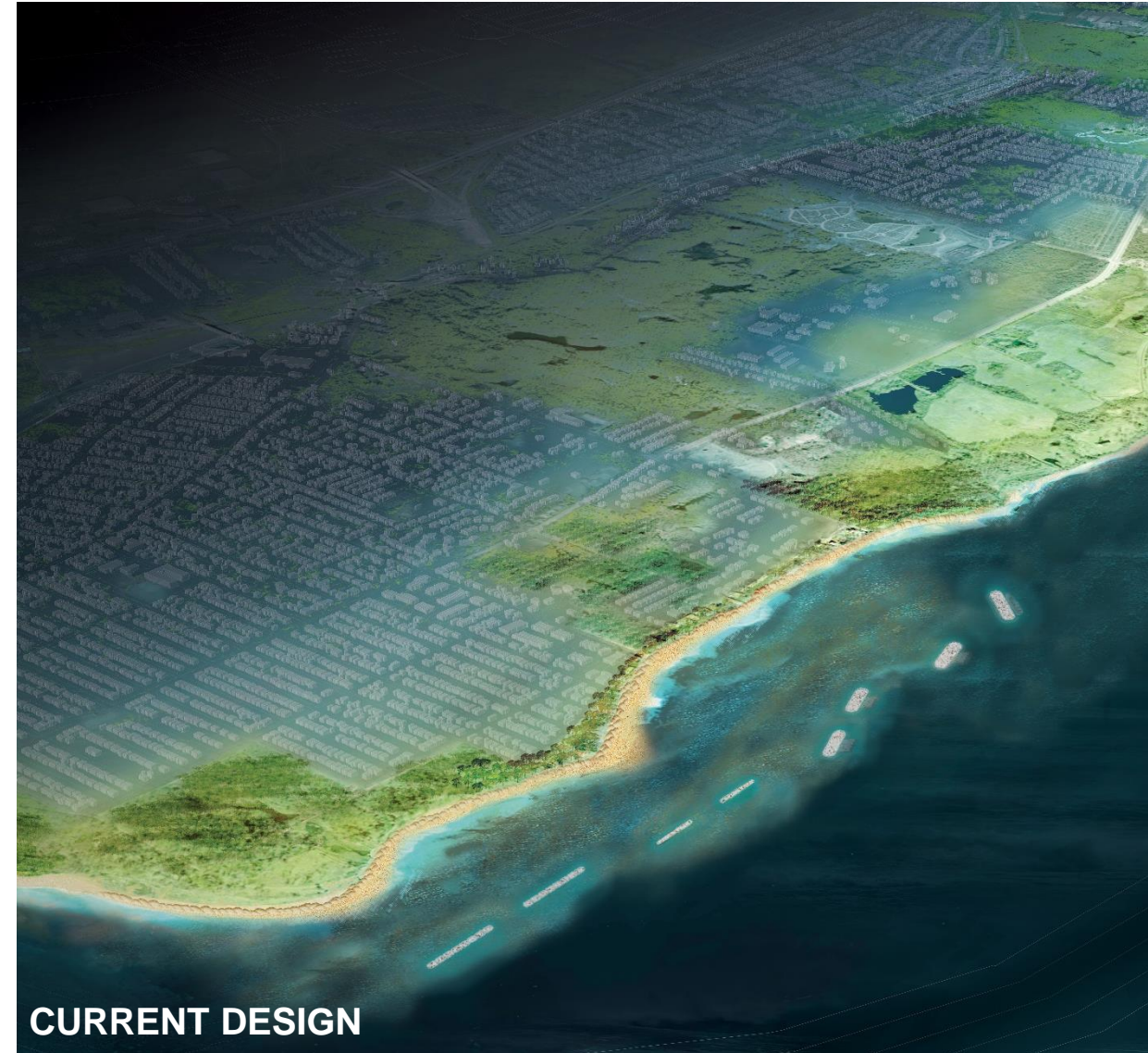
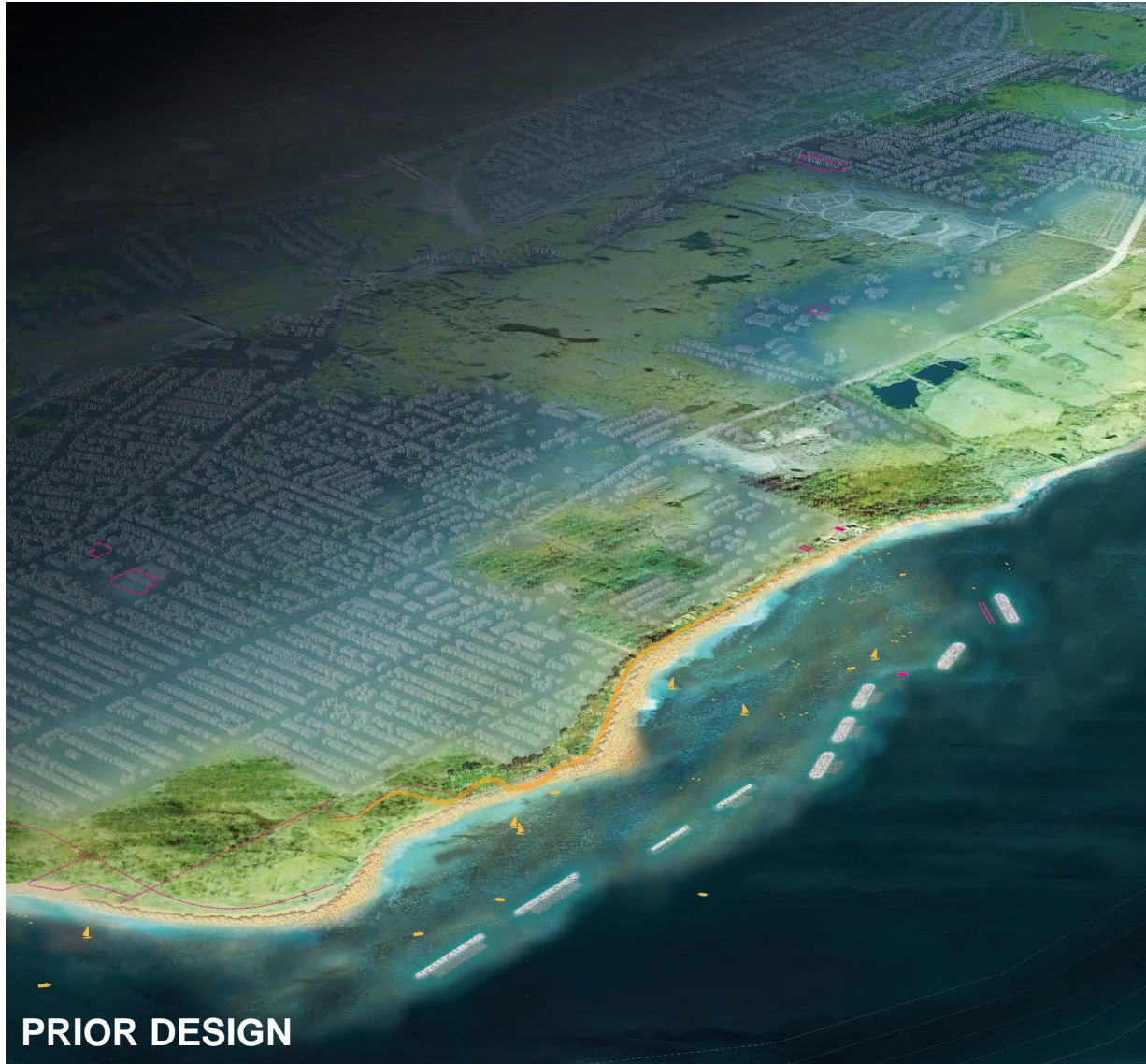


# Minor Design Changes



# WHAT ARE THE CHANGES?

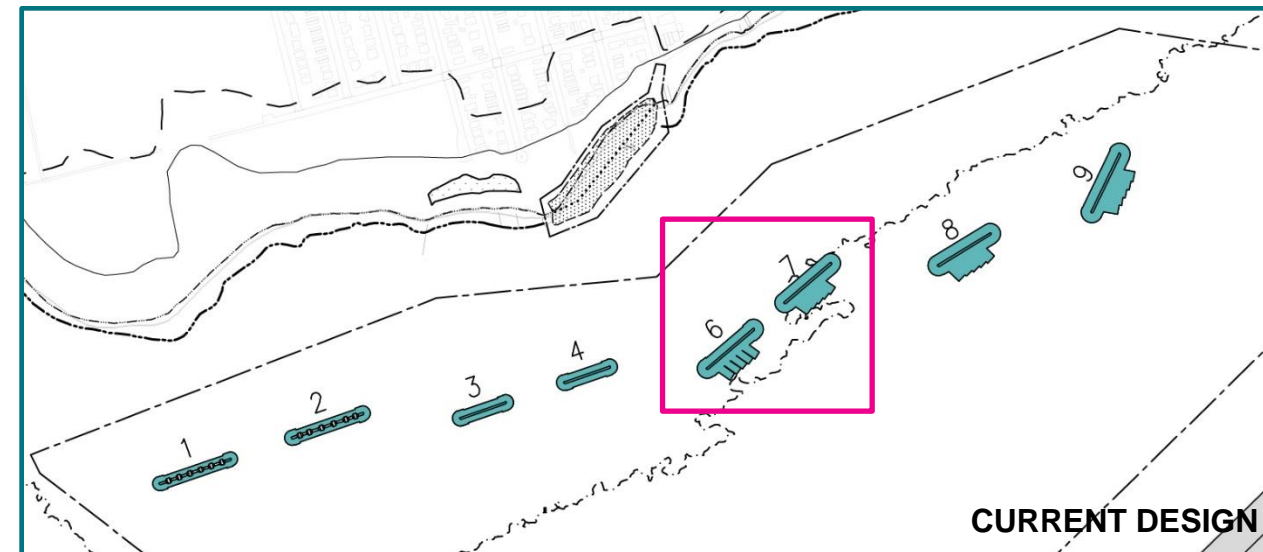
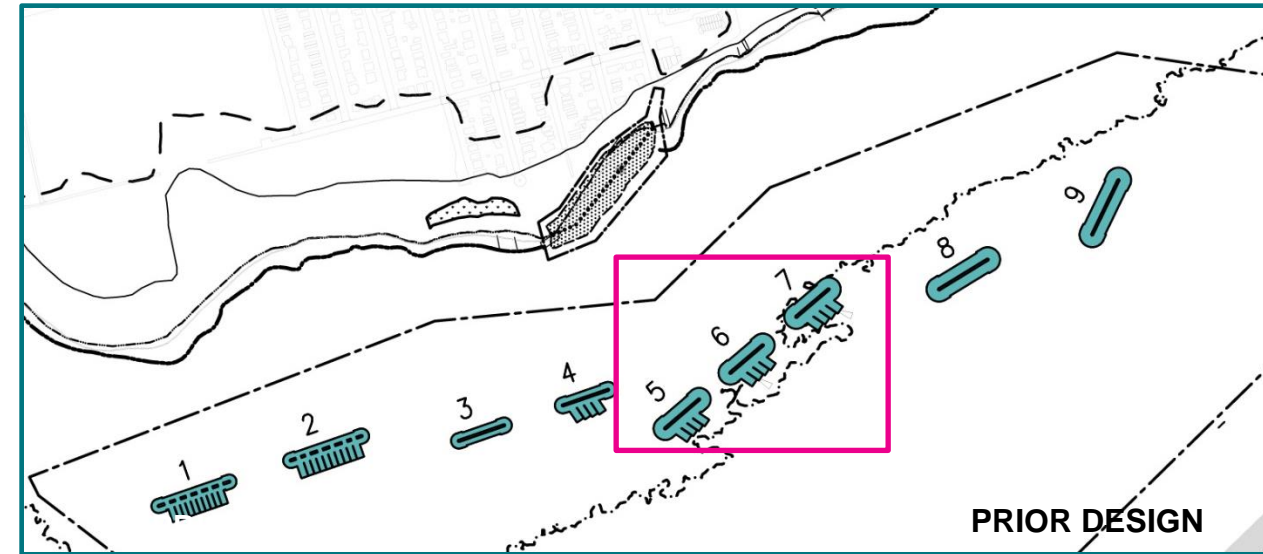
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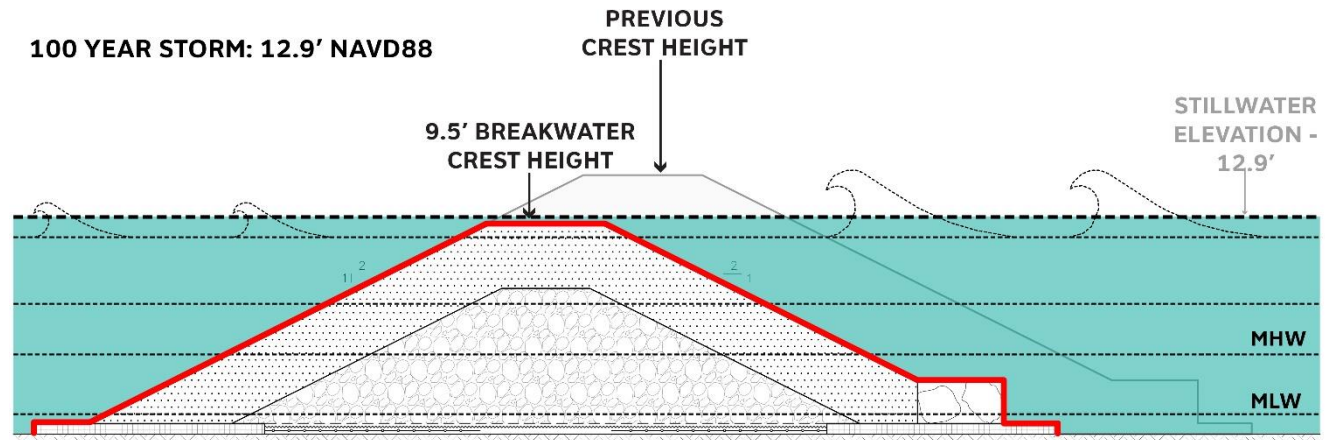
# DESIGN CHANGES

- **Eliminated a breakwater by consolidating three breakwaters into two**
- Reduced crest height of tallest breakwaters
- Reduced number of reef ridges and eco-concrete units
- Replaced some structural materials
- Adjusted some seasonal restriction requirements
- Provided additional time (2 years to 4 years)



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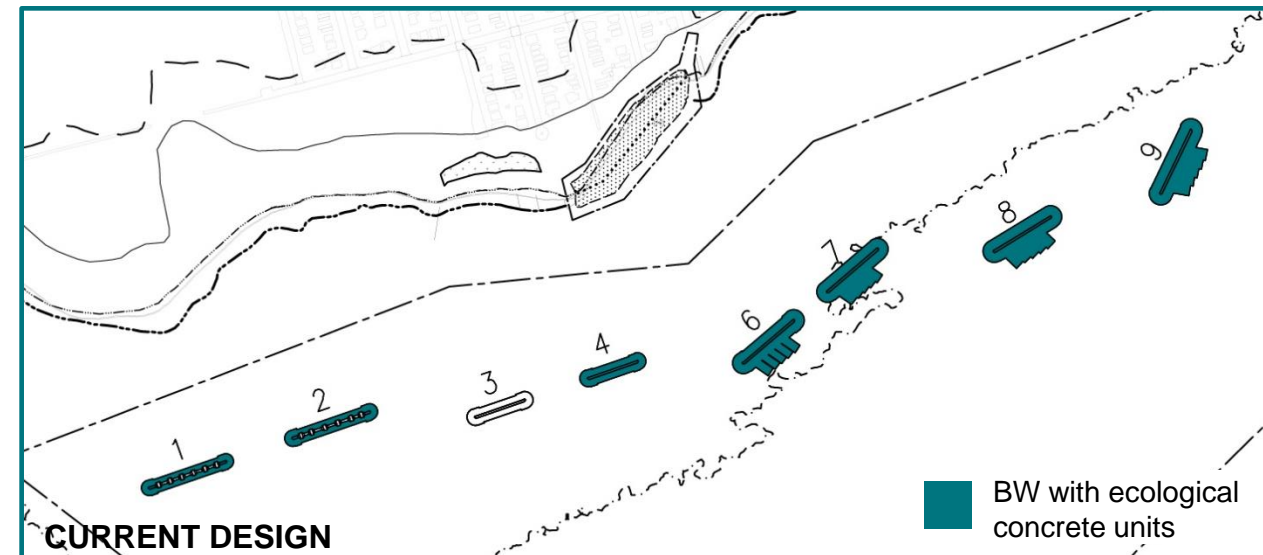
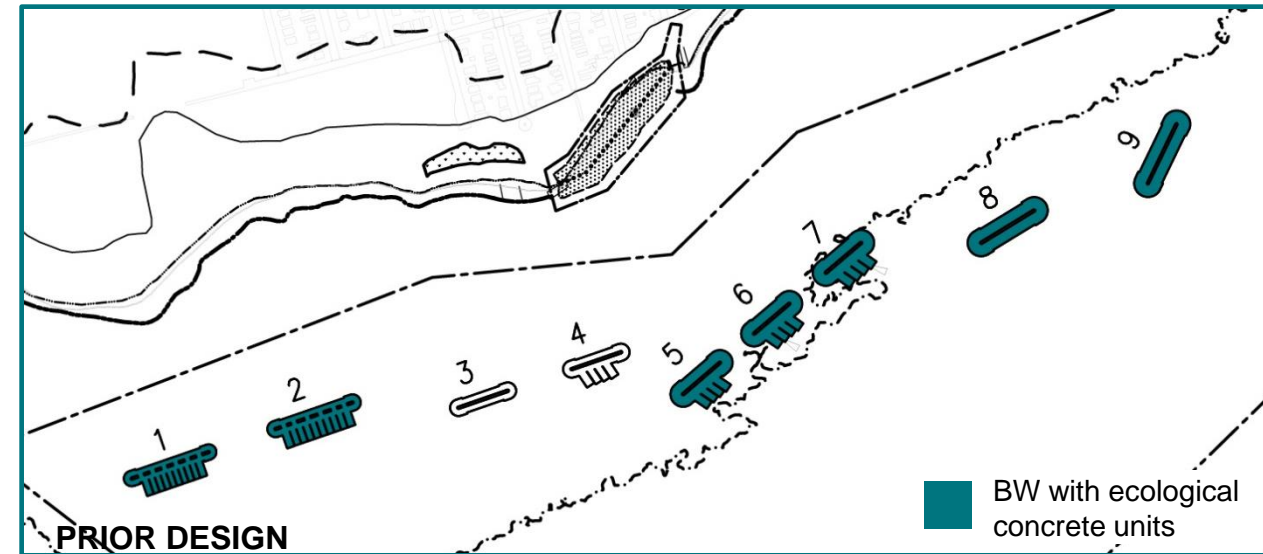
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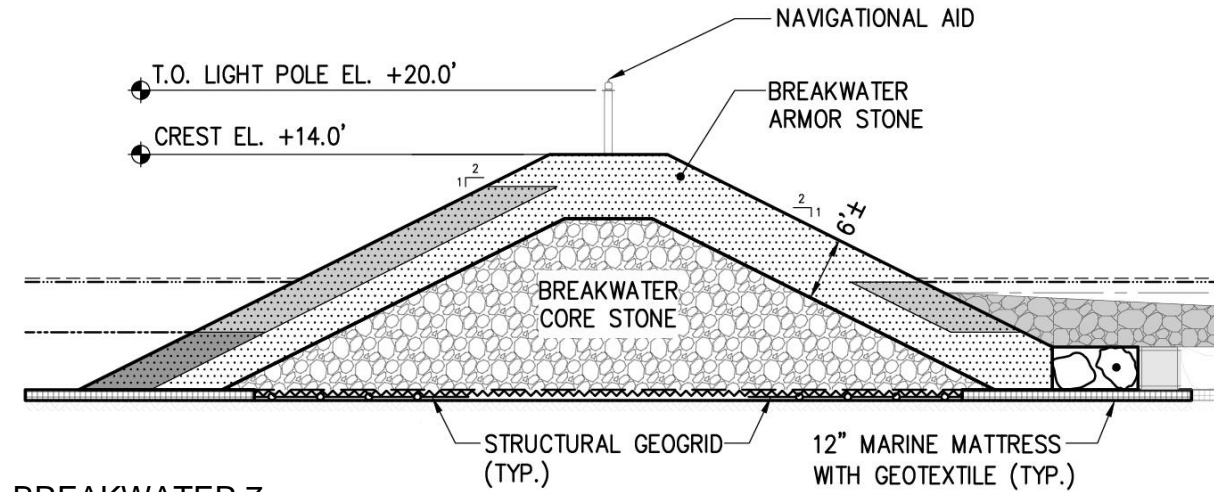
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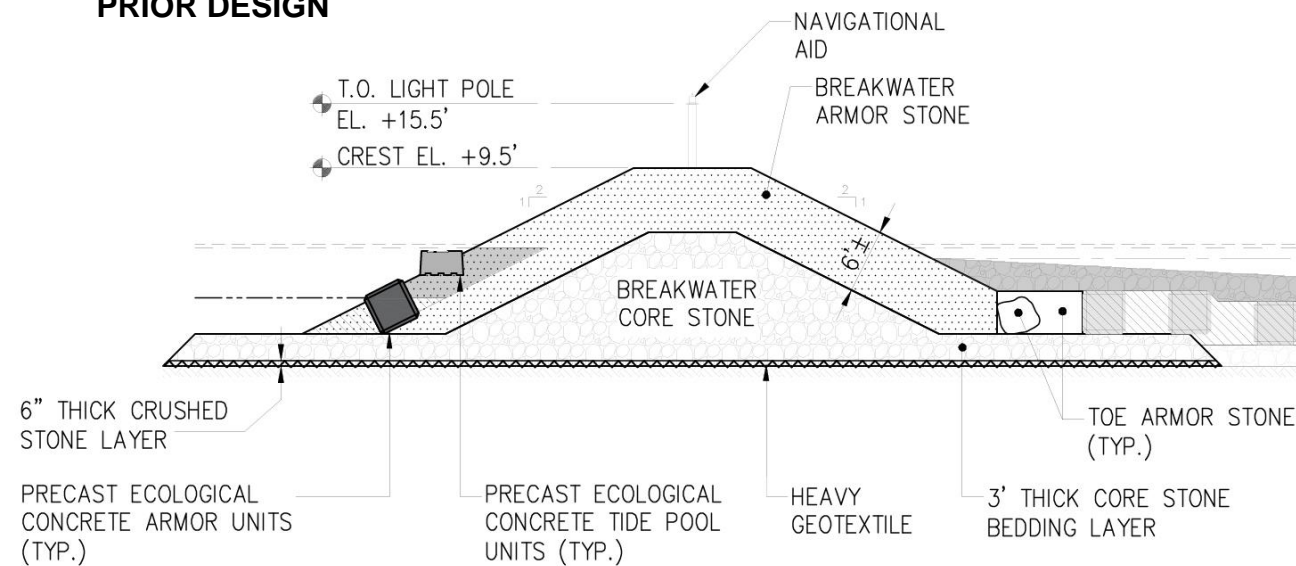


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**BREAKWATER 7  
PRIOR DESIGN**

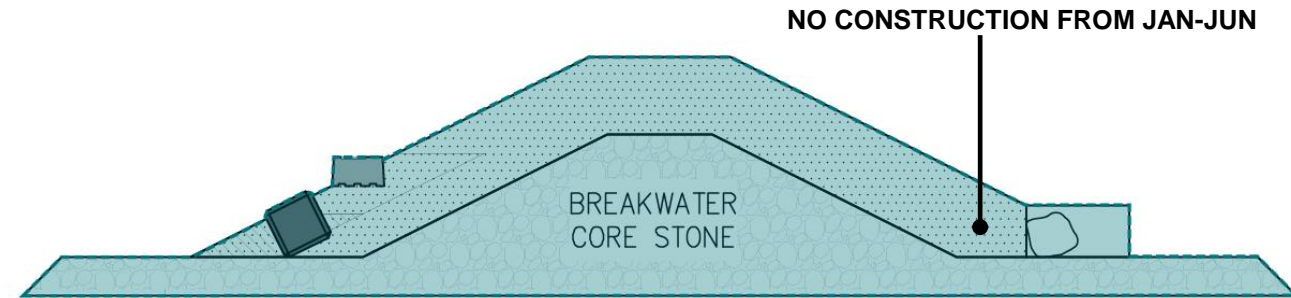


**BREAKWATER 7  
CURRENT DESIGN**

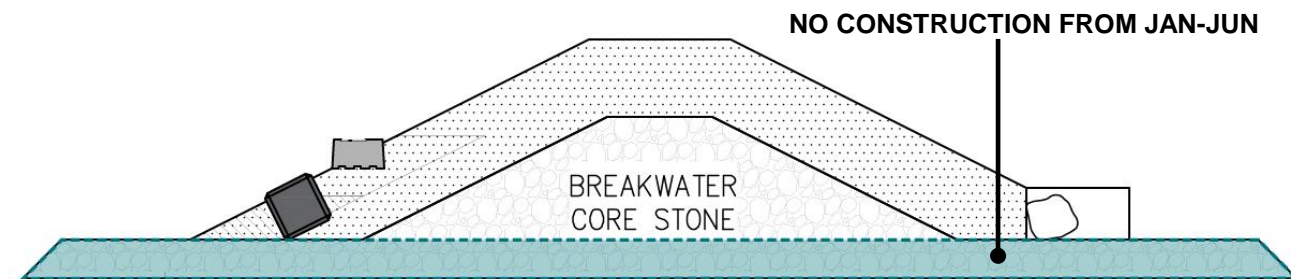
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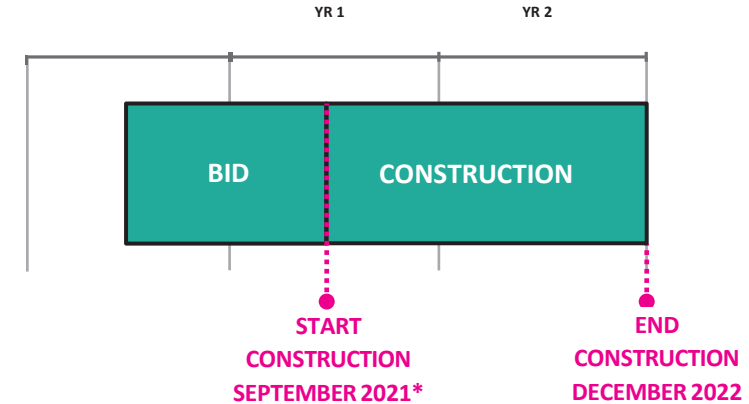
PREVIOUS ASSUMPTION



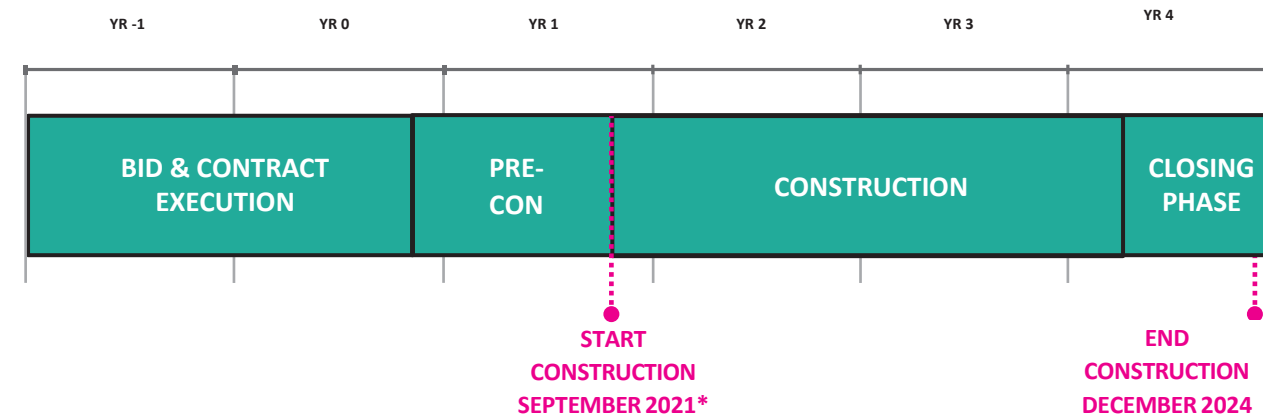
FINAL PERMIT

# DESIGN CHANGES

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- Reduced crest height of tallest breakwaters
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- **Provided additional time for construction (2 years to 4 years)**



## PRIOR DESIGN



## CURRENT DESIGN

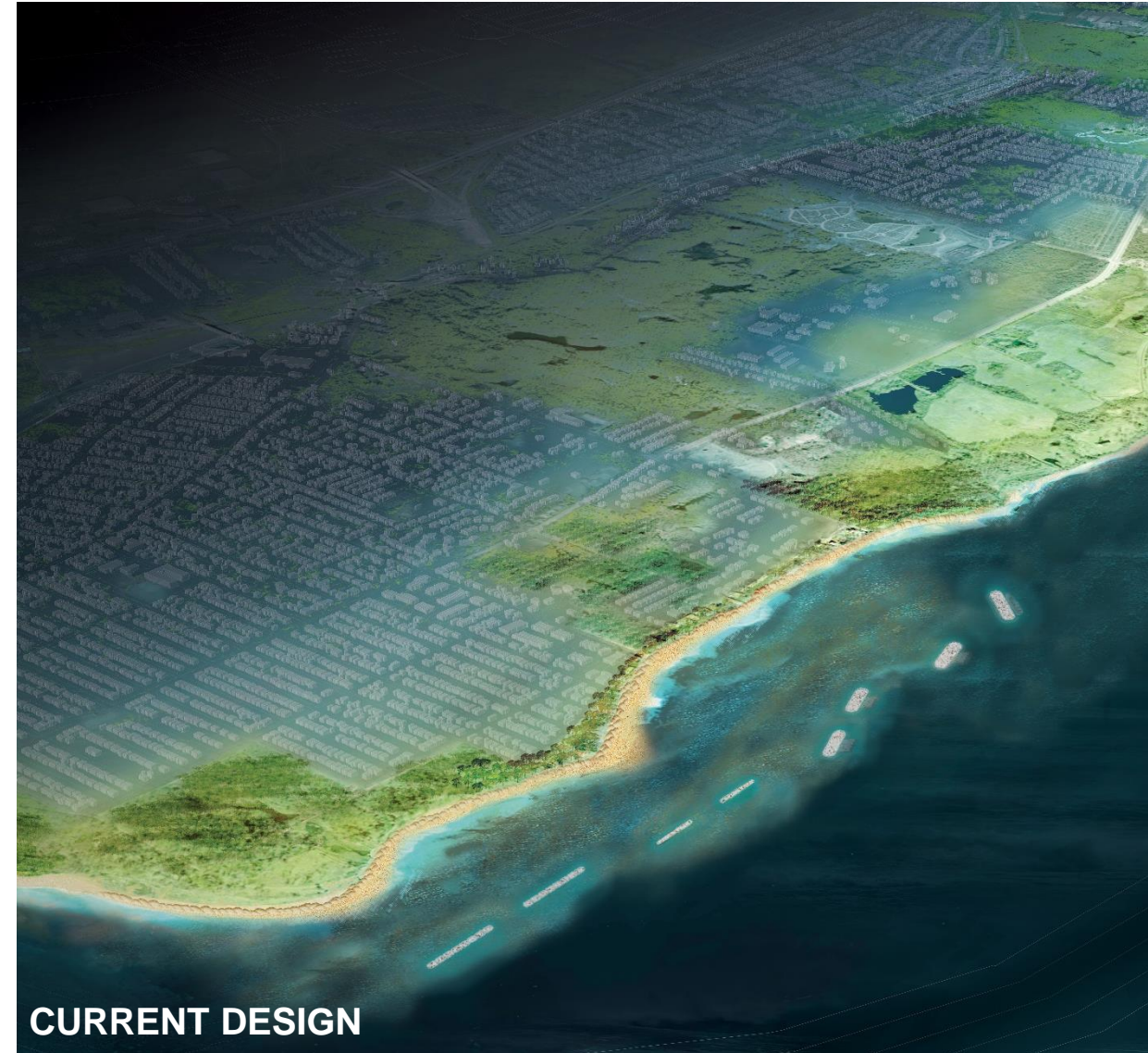
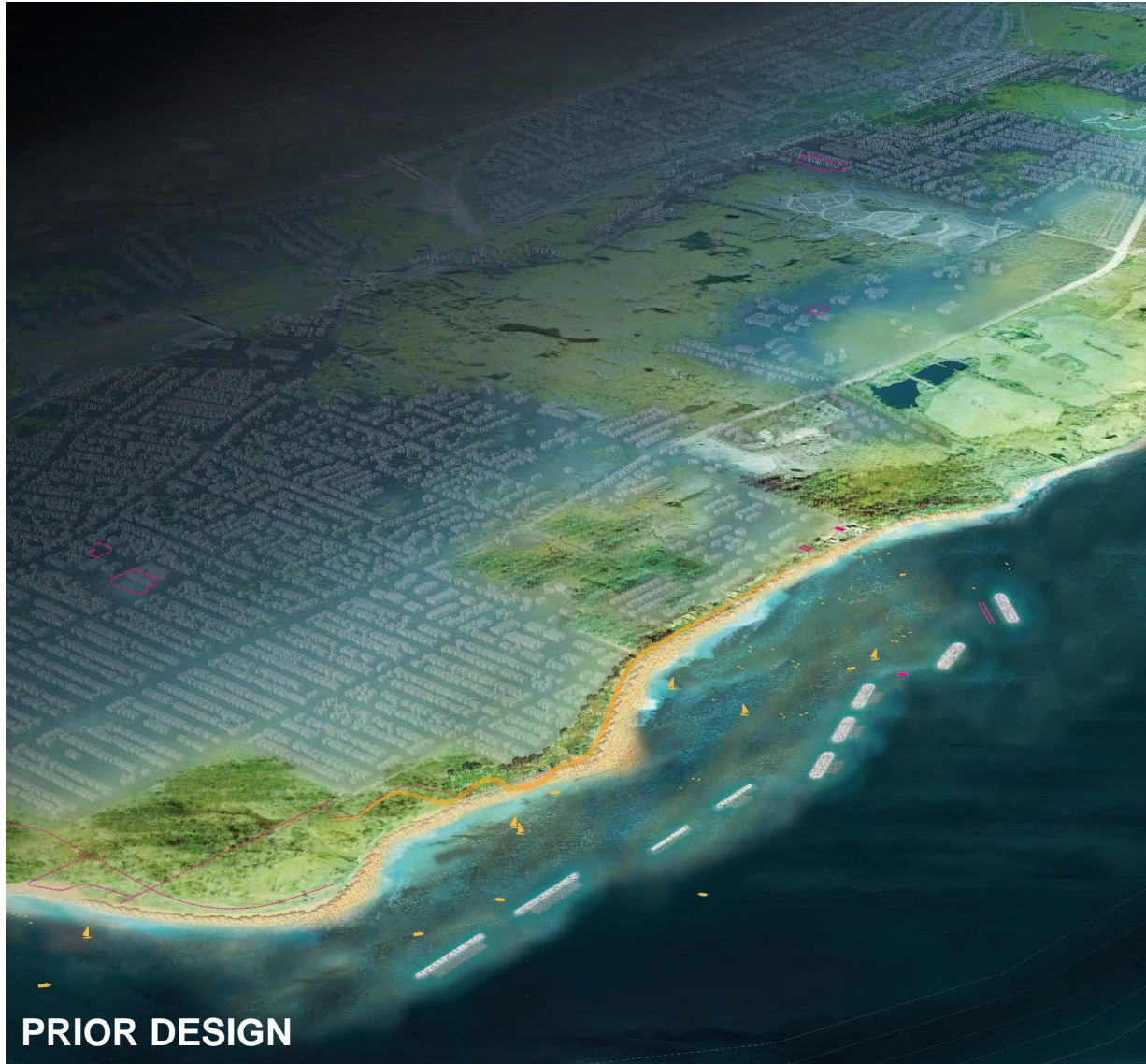
\*Anticipated construction restrictions:

- No in-water construction Jan 1 to May 31 (Winter Flounder Mating Season)
- No construction on the beach April 15 to July 25 (Horseshoe Crab Mating Season)



# DESIGN CHANGES

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# DESIGN CHANGE RESULTS

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- The breakwaters will continue to reduce the height and energy of waves reaching the shore during a 100-year storm event.
- The system will be more effective at combating erosion and building back the beach.
- Their effectiveness at increased storm wave attenuation plateaus at around 18 inches of sea level rise instead of 30 inches of sea level rise.

**PRIOR DESIGN**



**FINAL DESIGN**



# Budget



# BUDGET

- 
- 1 **Design/Permitting/Planning:**  
\$21 million
  - 2 **Construction:**  
\$78.7 million
  - 3 **Social Resiliency:**  
\$5.2 million
  - 4 **Program Administration:**  
\$2.1 million

**Total Cost:**  
**\$107 million**

\$60 million – HUD CDBG-DR

\$47 million – New York State

# Construction Schedule



# ANTICIPATED CONSTRUCTION TIMELINE

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In Water Construction start anticipated to begin between mid-July 2021 and October 2021

*Current estimated date for substantial completion of each breakwater:*

	2021		2022				2023				2024			
	Fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter
<b>Breakwater 1</b>		■												
<b>Breakwater 2</b>			■											
<b>Breakwater 3</b>				■										
<b>Breakwater 4</b>					■									
<b>Breakwater 6</b>								■						
<b>Breakwater 7</b>									■					
<b>Breakwater 8</b>												■		
<b>Breakwater 9</b>													■	
<b>Shoreline Restoration</b>													■	

\* Note: there are only 8 breakwaters there is no Breakwater #5

# Tottenville Shoreline Project Update



# TOTTENVILLE SHORELINE PROJECT

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05/XX/21

- 1 Current Cost Estimate**  
\$44.1 million  
(\$39.4 million construction)
- 2 GOSR Expenditure to Date:**  
\$4.7 million for design
- 3 NYC Committed Funds:**  
\$19.2 million
- 4 FEMA BRIC Application Request (submitted Dec 2020):**  
\$19.8 million

An aerial photograph of a coastal city. The left side shows a dense urban grid with many small buildings. The right side shows a beach area with a sandy shore and a body of water. Several small boats are visible in the water. The text "THANK YOU!" is overlaid in the center.

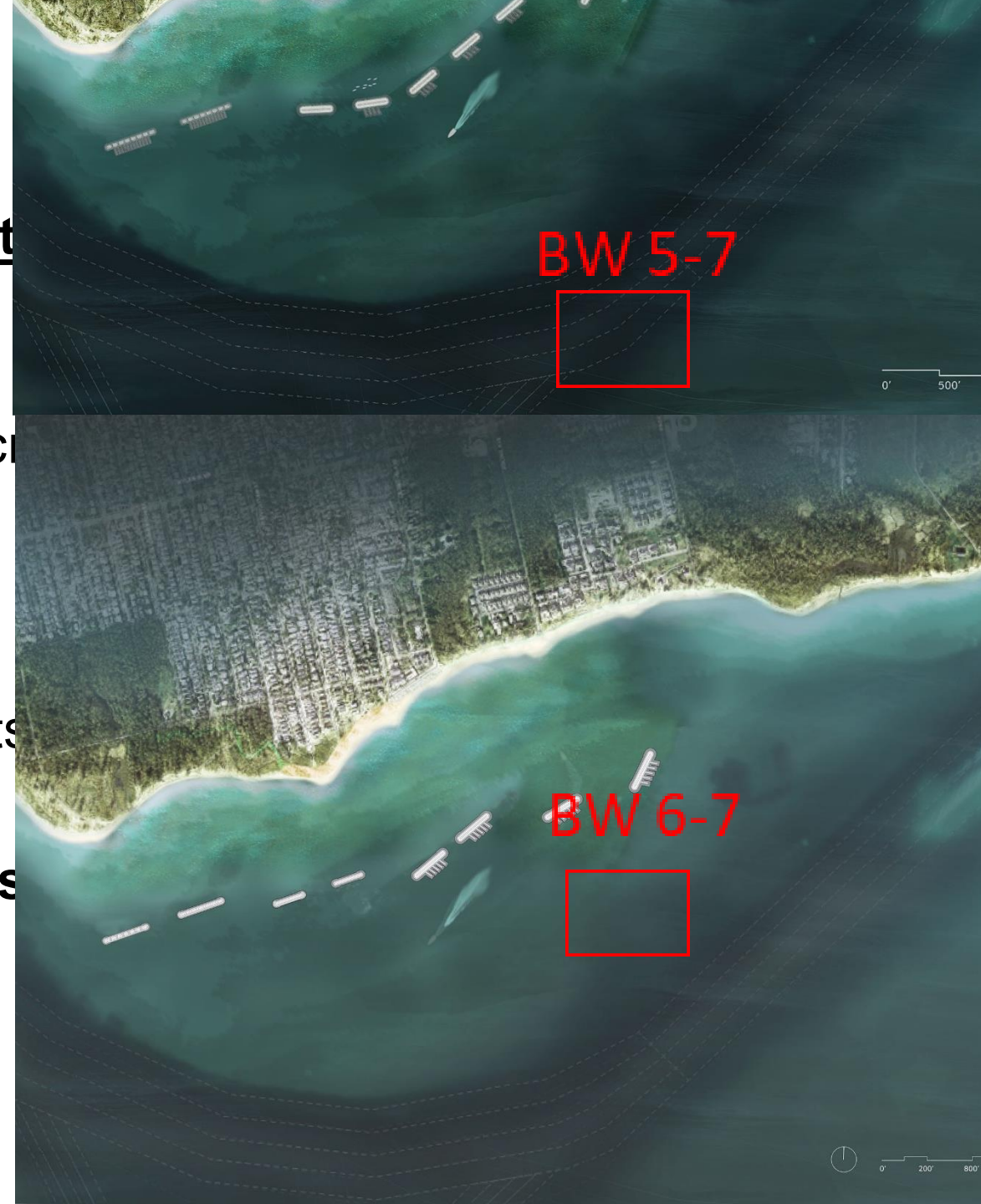
**THANK YOU!**





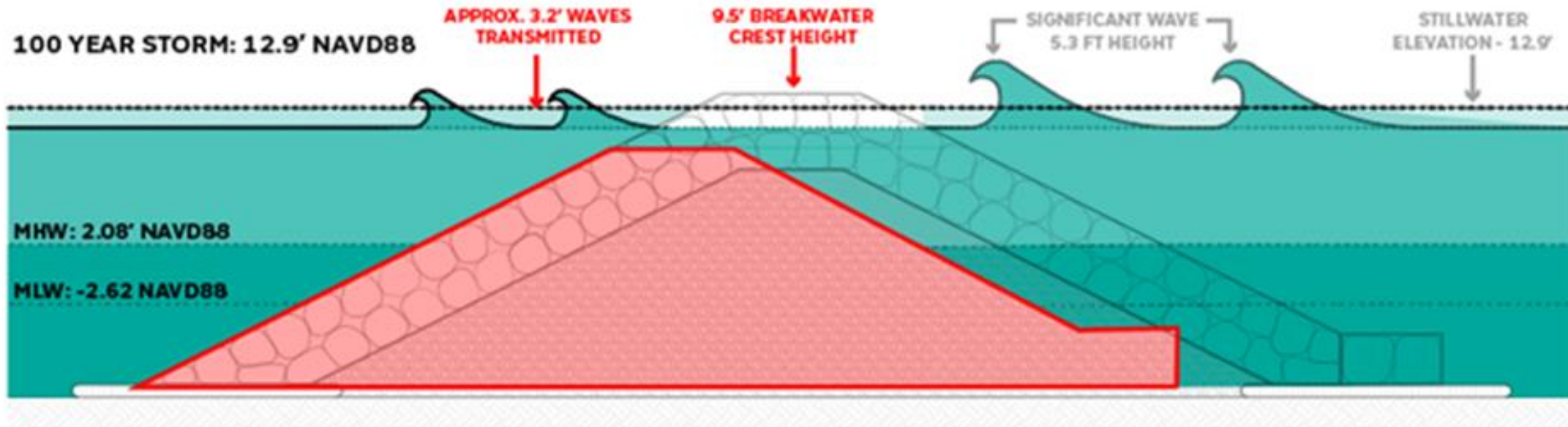
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- Adjust some seasonal restriction requirements
- **Total Approximate Estimated Cost Savings 1.5 million**



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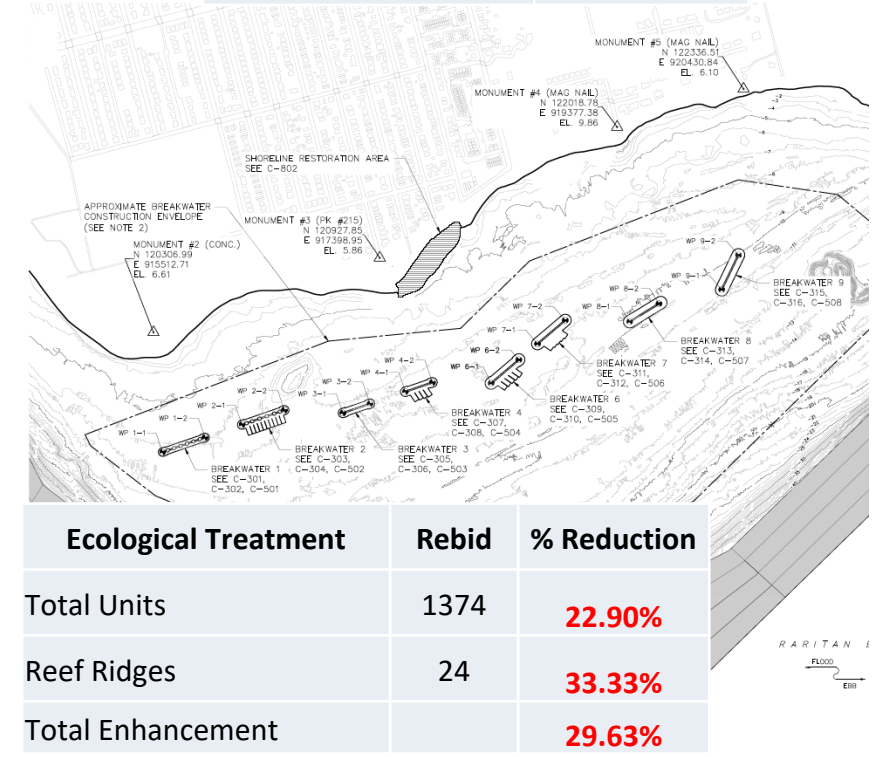
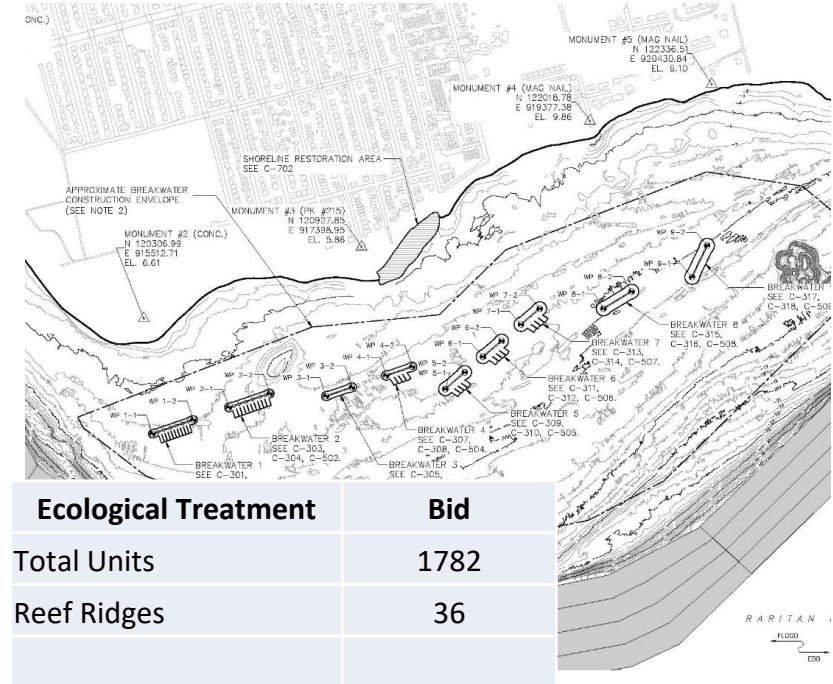
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- 
- **Total Approximate Estimated Cost Savings: \$21 million**





# DESIGN CHANGES

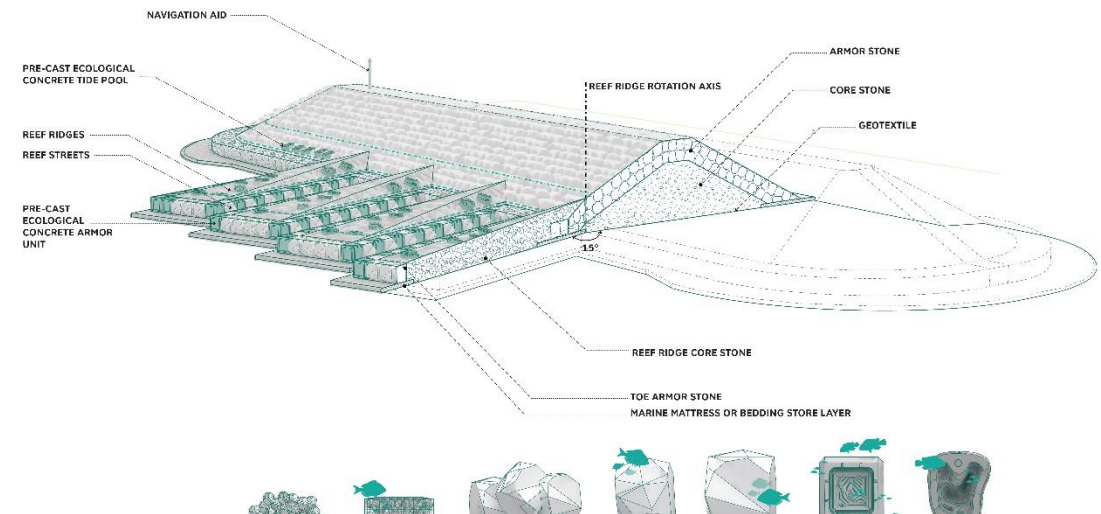
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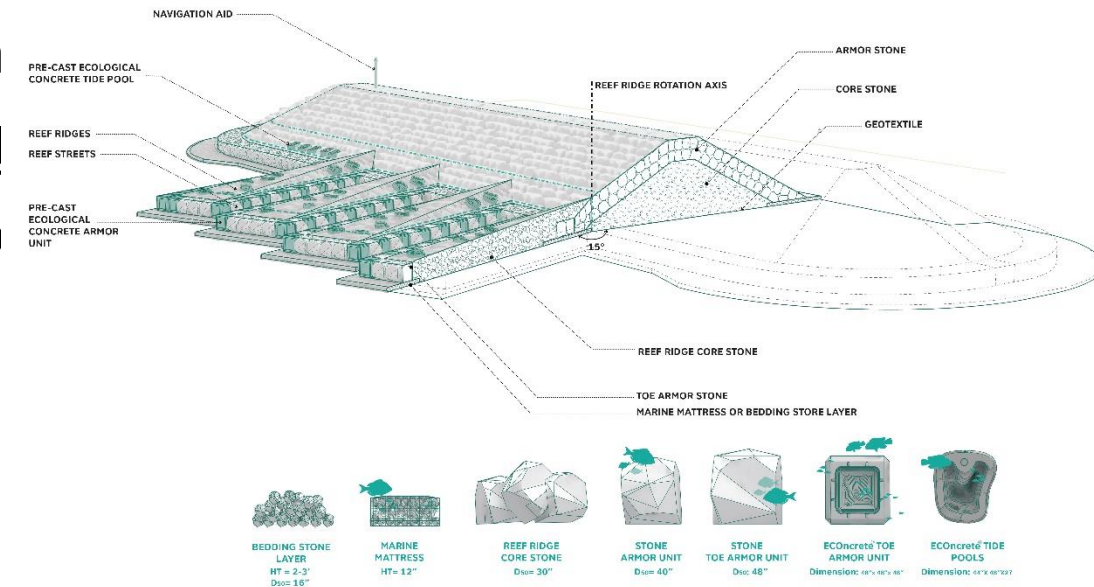
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- **Total Approximate Estimate**



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- **Total Approximate Estimated Cost**



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